STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES
PACIFIC CASCADE REGION

PATCHES

ROAD PLAN

SECTION 4, TOWNSHIP 08 NORTH, RANGE 05 WEST, W.M.
WAHKIAKUM COUNTY

ST. HELENS DISTRICT

AGREEMENT NO.: 30-076613

CONTRACT ADMINISTRATOR: Colin Robertson

DATE: 09/01/2004

STAFF ENGINEER: Robert Hoffman

DRAWN & COMPILED BY: Alicia Compton

SECTION 0 – SCOPE OF PROJECT

This project includes but is not limited to construction and optional construction including:

clearing;
grubbing;
right-of-way debris disposal;
excavation and/or embankment to subgrade;
landing construction;
acquisition and installation of drainage structures;
acquisition, manufacture, and application of rock;
road deactivation;
grass seeding.

This project also includes but is not limited to reconstruction and optional reconstruction including:

pulling ditches;
cleaning ditches;
grading and shaping existing road surface and turnouts.

This project also includes but is not limited to pre-haul maintenance including:

grade and shape existing road surface and turnouts.

This project also includes but is not limited to abandonment including:

light abandonment;
heavy abandonment.

SECTION 1 - GENERAL CLAUSES

1.1-1

Clauses in this plan apply to all construction, reconstruction, pre-haul maintenance, or abandonment including landings unless otherwise noted.

1.1-2

Construction, reconstruction or pre-haul maintenance of the following roads is required. All roads shall be constructed, reconstructed, or pre-haul maintained on the State's location and in accordance with this Road Plan.

Road	Stations	Type
Spur 1	0+00 to 8+56	Reconstruction
Spur 1	8+56 to 10+49	Construction
E-3000	0+00 to 52+80	Pre-haul maintenance
East Road	0+00 to 16+15	Pre-haul maintenance

1.1-3

Construction or reconstruction of the following roads is not required. Roads used by the Purchaser shall be constructed or reconstructed on the State's location and in accordance with this Road Plan.

Road	Stations	Type
T-1	0+00 to 7+54	Reconstruction
T-2	0+00 to 6+28	Reconstruction

1.1-4

If the Purchaser desires a road location or design change, a revised Road Plan shall be submitted to the State for consideration.

1.1-5

On this plan quantities are minimum acceptable values. Additional quantities required by the State because of hidden conditions or Purchaser's choice of construction season or techniques shall be at the Purchaser's expense. Hidden conditions include, but are not limited to: solid subsurface rock, subsurface springs, saturated ground, and unstable soil.

1.1-10

Abandonment of the following roads is required. All roads shall be abandoned in accordance with this Road Plan.

Road	Stations	Type
T-2	0+00 to 9+63	Light
T-2	9+63 and 17+35	Heavy
T-2	10+85 to 17+35	Light
T-1	0+00 to 7+54	Light

1.2-2

Purchaser shall not use roads constructed or reconstructed or pre-haul maintained under this Road Plan for hauling, other than timber cut on the right-of-way, without written approval from the Contract Administrator.

1.2-6

Pioneering shall not extend past construction that will be completed during the current construction season. Drainage shall be provided on all uncompleted construction as approved, in writing, by the Contract Administrator.

Clearing and grubbing shall be completed prior to starting excavation and embankment.

Culvert placement in live streams shall precede embankment where culverts are to be placed along natural ground.

Culverts shall be installed in completed subgrade as construction progresses.

Subgrade, ditches, and culvert installations shall be completed and are subject to written approval by the Contract Administrator prior to rock application and timber haul.

1.3-2

All optional roads are intended for dry weather use. Hauling shall be suspended when wheel track rutting exceeds 4 inches unless Purchaser elects to correct the situation at his/her own expense. Corrective measures and continued operations are subject to written approval by the Contract Administrator.

1.4-3

Reference points (R.P.'s) that are moved or damaged at any time during construction shall be reset in their original locations by the Purchaser. Excavation and embankment shall not proceed on road segments controlled by said R.P.'s until all moved or damaged R.P.'s are reset.

1.5-1

Maintenance on roads listed in Contract Clauses C-50 (Purchaser Road Maintenance and Repair) and C-60 (Designated Road Maintainer shall be performed in accordance with Forest Access Road Maintenance Specifications.

1.5-2

Roads shall be maintained in a condition that will allow the passage of light administrative vehicles.

SECTION 2 - CLEARING

2.1-1

Fell all vegetative material larger than 2 inches DBH or over 5 feet high between the marked right-of-way boundaries or if not marked in the field, between clearing limits specified on TYPICAL SECTION SHEET.

SECTION 3 - GRUBBING

3-1

All stumps shall be removed that fall between grubbing limits shown on the TYPICAL SECTION SHEET. Those outside the grubbing limits but with undercut roots shall also be removed. Stumps over 22 inches diameter shall be split. Stumps over 40 inches shall be quartered.

3-2

Grubbing limits are defined as the entire area between the external limits shown on the TYPICAL SECTION SHEET.

SECTION 4 - DEBRIS DISPOSAL AND REMOVAL

4.1-1

Right-of-way debris is defined as all nonmerchantable vegetative material larger than one cubic foot in volume within grubbing limits.

4.1-2

All right-of-way debris disposal shall be completed prior to the application of rock.

4.2.3-1

Right-of-way debris shall be scattered outside the grubbing limits of all roads.

4.2.3-2

Right-of-way debris shall not be placed against standing timber.

SECTION 5 - EXCAVATION

5.1-1

Roads shall be constructed or reconstructed in accordance with dimensions shown on the TYPICAL SECTION SHEET.

5.1-2

Purchaser shall not bury merchantable material.

5.1-3

Road grade and alignment shall conform to the State's marked location. Grade and alignment shall have smooth continuity without abrupt changes in direction. Maximum grades are 18 percent favorable and 12 percent adverse. Minimum radius curve is 60 feet.

5.1-4

Minimum extra widening on the inside of curves shall be:

5 feet extra	80 to 100 foot radius curve
7 feet extra	60 to 80 foot radius curve

5.1-5

Curve widening, where required, shall be added to the inside of curves.

5.1-7

Roads shall be constructed or reconstructed to the dimensions shown on the TYPICAL SECTION SHEET, within the tolerance listed below. Tolerance classes for each road are listed on the TYPICAL SECTION SHEET.

Tolerance Class	A	B	C
Road Width (feet)	+1.5	+1.5	+2.0
Subgrade elevation (feet +/-)	0.5	1.0	2.0
Centerline alignment (feet lt./rt.)	1.0	1.5	3.0

5.1-8

Excavation slopes shall be constructed no steeper than shown on the following:

Material Type	Excavation Slope Ratio
Common Earth (on side slopes of 55%)	1:1
Common Earth (55% to 70% sideslopes)	¾:1
Common Earth (on slopes over 70%)	½:1
Fractured or loose rock	½:1
Hardpan or solid rock	¼:1

5.1-9

Excavation and embankment slopes shall be constructed to a uniform line and left rough for easier revegetation.

5.1-10

Embankments shall be widened as follows:

Height at Centerline	Subgrade Widening
Less than 6 feet	2 feet
6 feet or over	4 feet

5.1-11

Embankment slopes shall be constructed no steeper than shown on the following:

Material Type	Embankment Slope Ratio
Common Earth and Rounded Gravel	1½:1
Angular Rock	1¼:1
Sandy Soils	2:1

5.1-12

Organic material shall be excluded from embankment as shown on the TYPICAL SECTION SHEET.

5.1-14

Where side slopes exceed 45 percent, full bench construction shall be utilized for the entire subgrade width.

5.1-16

Turnout locations noted on this plan are approximate. Locations shall be adjusted to fit with final subgrade alignment and sight distances. Location shall be subject to written approval of the Contract Administrator.

5.1-17

Turnouts shall be intervisible with a maximum of 1,000 feet between. Location shall be subject to written approval of the Contract Administrator.

5.1-18

Turnarounds shall be no larger than 30 feet long and 30 feet wide.

5.1-21

Purchaser shall construct ditches as shown on the TYPICAL SECTION SHEET.

5.1.1-1

Waste material shall not be deposited within 50 feet of a cross drain culvert installation.

5.1.1-2

Waste material shall not be deposited within 100 feet of a live stream.

5.1.1-3

Waste material may be deposited adjacent to the road prism on side slopes up to 45 percent if the waste material is compacted and more than 100 feet away from live streams. On side slopes of 45 percent or more, all excavation shall be end hauled or pushed to designated embankment sites. All waste embankments shall be compacted in horizontal layers not exceeding 2 feet.

5.1.1-5

When constructing landings, waste material and embankment shall not be placed on side slopes steeper than 45%.

5.1.1-8

The amount of material to be contained in a waste area shall be at the discretion of the Contract Administrator.

5.2-1

Road pioneering operations shall not undercut the final cut slope, deposit excavated material outside the grubbing limits, or restrict drainage.

5.3-1

All embankment and waste material shall be compacted. The minimum acceptable compaction is achieved by placing embankments in 2 foot or shallower lifts and routing excavation equipment over entire width of the lifts. Side hill embankments too narrow to accommodate excavation equipment may be placed by end-dumping or side casting until sufficiently wide to support the equipment.

5.4-1

Silt-bearing runoff shall not be permitted to go into streams.

5.4-3.1

Purchaser shall furnish and evenly spread the seed mixture listed below on all exposed soil inside the grubbing limits at a rate of 40 pounds per acre. The date of application is subject to approval by the Contract Administrator.

Mixture Percent by Weight	Minimum Percent Germination
50% Fescue, Red	90% Germination
25% Ryegrass, Perennial	90% Germination
15% Bentgrass	85% Germination
10% Clover, White and White Dutch (inoculated)	90% Germination

Weed seed shall not exceed 0.5% by weight.

5.5-2

On the following roads, constructed or reconstructed subgrades shall be compacted by routing hauling equipment over the width of the subgrade.

Road	Stations
Spur 1	0+00 to 10+49
T - 2	0+00 to 10+77
T - 1	0+00 to 7+54

5.5-5

Finished subgrade shall be crowned as shown on the TYPICAL SECTION SHEET, and shall be uniform, firm, rut-free, and shaped to ensure surface runoff in an even, unconcentrated manner.

SECTION 6 - DRAINAGE

6.1-2

On the following roads, berms shall be removed from shoulders to permit escape of runoff.

Road	Stations
E-3000	0+00 to 52+80

6.2.1-1.1

Purchaser shall furnish, install, and maintain galvanized culverts meeting AASHTO M-36 or corrugated polyethylene pipe meeting AASHTO specification No. M-294-S as designated on the CULVERT LIST. Culvert and flume lengths shall be varied to fit as-built conditions subject to written approval by the Contract Administrator. Refer to Hydraulic Project Approval/s for applicable culvert installations.

6.2.1-2

Annular corrugated bands and culvert ends shall be used on metal culverts. On culverts 24 inches and smaller, bands shall have a minimum width of 12 inches, on culverts over 24 inches, bands shall have a minimum width of 24 inches. Manufacturer's approved connectors shall be used for corrugated polyethylene pipe.

6.2.1-5

On required roads: culverts, downspouts, flumes, bands, and gaskets as listed on the CULVERT LIST, which are not installed, shall become property of the State.

6.2.2.1-1

Culvert, downspout, flume, and energy dissipater installation shall be in accordance with CULVERT AND DRAINAGE SPECIFICATION DETAIL and the National Corrugated Metal Pipe Association "Installation Manual for Corrugated Steel Drainage Structures" and the Corrugated Polyethylene Pipe Association "Recommended Installation Practices for Corrugated Polyethylene Pipe and Fittings."

6.2.2.1-2

Purchaser shall provide rubberized gaskets for all culverts with a vertical rise greater than 42 inches.

6.2.2.2-1

Any damaged galvanized coating or cut ends shall be retreated with a minimum of 2 coats of zinc rich paint.

6.2.2.3-1

Cross drains and surface culverts on road grades in excess of 3% shall be skewed at least 30 degrees from perpendicular to the road centerline, except that cross drain culverts at the low points of dips in roads shall not be skewed.

6.2.2.3-2

Cross drain culverts shall be installed at a slope steeper than the incoming ditch grade, but not less than 3% nor more than 10%.

6.2.2.4-1

Installations of culverts 30 inches in diameter and over shall be subject to written approval by the Contract Administrator or Region Engineer or their designee prior to making backfill.

6.2.2.5-1

Drainage structure outfalls shall not terminate directly on unprotected soil that will erode. Downspouts, flumes, and energy dissipaters shall be installed to prevent erosion.

6.3-1

Ditches shall be constructed concurrently with construction of the subgrade. Ditches shall drain to culverts, ditchouts, and natural drainages.

6.3-2

Shaping the ditchline, culvert headwalls, and catch basins shall be completed prior to application of rock and shall be done in accordance with the TYPICAL SECTION SHEET and CULVERT AND DRAINAGE SPECIFICATION DETAIL.

6.4-1

Catch basins shall be constructed to resist erosion in accordance with CULVERT AND DRAINAGE SPECIFICATION DETAIL. Minimum dimensions: two feet wide and four feet long with backslopes consistent with Clause 5.1-8: Excavation Slopes.

6.5-1

Headwalls shall be constructed in accordance with CULVERT AND DRAINAGE SPECIFICATION DETAIL at all cross drain culverts.

SECTION 7 - ROCK

7.1-1

Rock for construction and/or reconstruction under this contract may be obtained from a sources on State land as listed below at no charge to the Purchaser. Development and use shall be in accordance with a written "Development Plan" prepared by the State. A copy of the written plan is available upon request from the Pacific Cascade Region office. Upon completion of operations, the rock source shall be left in the condition specified in said plan, subject to approval by the Contract Administrator. Use of material from any other source must have prior written approval from the Contract Administrator. If other operators are using or desire to use these rock sources, joint operating plans shall be developed. All parties shall follow these plans.

Source	Location
Cathlamet Pit	Section 1, T8N, R4W, W.M.
3600 Pit Stockpile	Section 9, T8N, R5W, W.M.

Rock from other sources must be approved, in writing, by the Contract Administrator.

Any enlargement and/or development of a rock source site on State land must be with written approval of the Department of Natural Resources. Upon completion of operations, the site shall be left in a workable or a reclaimed condition, subject to written approval by the Contract Administrator.

7.1-3

All rock source operations shall be conducted as directed by the Contract Administrator and in accordance with an approved development plan on file at the Pacific Cascade Region office.

7.2.1-1

Purchaser shall crush rock from the Cathlamet Pit to manufacture 7,500 cubic yards truck measure of 2 1/2 INCH MINUS rock in accordance with the Washington State Department of Transportation 2004 Standard Specifications for Road, Bridge, and Municipal Construction, Section 9-03.9(1) (Aggregates for Ballast and Crushed Surfacing-Ballast).

7.2.1.1-5

2½ INCH MINUS CRUSHED ROCK

% passing 2½" square sieve	100%
% passing 2" square sieve	65 -100%
% passing 1" square sieve	50 - 70%
% passing ¼" square sieve	30 - 50%
% passing U.S. #40 sieve	16% Max.
% passing U.S. #200 sieve	5% Max.

All percentages are by weight.

7.2.2-1

Rock crushing operations shall conform to the following specifications:

a. The Purchaser shall provide a weatherproof field laboratory equipped with gradation testing equipment. This laboratory shall be available for use by the Contract Administrator during the entire crushing operation.

7.2.3-1

Measurement of the 2½ INCH MINUS CRUSHED rock shall be on a cubic yard truck measure basis. Each truck box shall be measured by the Contract Administrator prior to rock hauling. The Contract Administrator shall periodically require that a load be flattened off and its volume calculated. An average of such volumes for each truck shall be used to tally the volume to be hauled. The Purchaser shall provide and maintain load tally sheets for each truck and shall give them to the Contract Administrator upon request.

7.2.4-1

Rock drilling and shooting shall meet the following specifications:

a. Oversize material remaining in the rock source at the conclusion of the timber sale shall not exceed 5 percent of the total volume mined for the sale. No oversize material shall remain in the rock source at the termination of this timber sale.

b. Oversize material is defined as rock fragments larger than two feet in any dimension.

c. The Purchaser shall submit an informational drilling and shooting plan to the Contract Administrator 3 working days prior to any drilling. (Form #M-126PAC).

7.3-1

Rock stockpiles shall meet the following specifications:

Before placing aggregates upon the stockpile site, the site shall be cleared of vegetation, trees, stumps, brush, rocks, or other debris and the ground leveled to a smooth, firm, uniform surface.

The piles, when completed, shall be neat and regular in shape. The stockpile height shall be limited to a maximum of 24 feet. Stockpiles in excess of 200 cubic yards shall be built up in layers not more than 4 feet in depth. Stockpile layers shall be constructed by trucks, "clamshells" or other methods approved, in writing, by the Contract Administrator. Pushing aggregates into piles with a bulldozer shall not be permitted. Each layer shall be completed over the entire area of the pile before depositing aggregates in the next layer. The aggregate shall not be dumped so that any part of it runs down and over the lower layers in the stockpile. The method of dropping from a bucket or spout in one location so as to form a cone shaped pile will not be permitted.

Stockpiles of different types or sizes of aggregate shall be spaced far enough apart, or separated by suitable walls or partitions, to prevent the mixing of the aggregates.

When removing materials from the face of the stockpile, the equipment shall be operated in such a manner as to face-load from the floor to the top of the stockpile.

Purchaser shall stockpile 6000 cubic yards of 21/2 inch minus in a location approved by the Contract Administrator.

7.4.2-1

Apply at least the minimum required rock quantity as shown on the ROCK LIST. Required and optional rock shall meet the specifications on the ROCK LIST.

7.4.2-5

Subgrade shall be approved, in writing, by the Contract Administrator prior to application of rock.

7.4.2-6

A grader shall be used to shape the subgrade of all roads constructed or re-constructed prior to the application of rock.

7.4.2-9

Turnouts and curve widening shall have rock applied to the same depth and specifications as the traveled way.

7.4.3-3

Rock shall be spread in 12" lifts and compacted using loaded haul trucks concurrently with rock hauling operations.

Road	Stations
Spur 1	0+00 to 10+49
T-1	0+00 to 7+54
T-2	0+00 to 6+28

SECTION 10 - ROAD AND LANDING ABANDONMENT

10.1-1

The following roads shall be abandoned by the Purchaser at the termination of use.

Road	Stations	Type
T-1	0+00 to 7+54	Light
T-2	0+00 to 6+28	Light
T-2	6+28 to 17+35	Light & Heavy

10.1-2

Light Abandonment shall consist of:

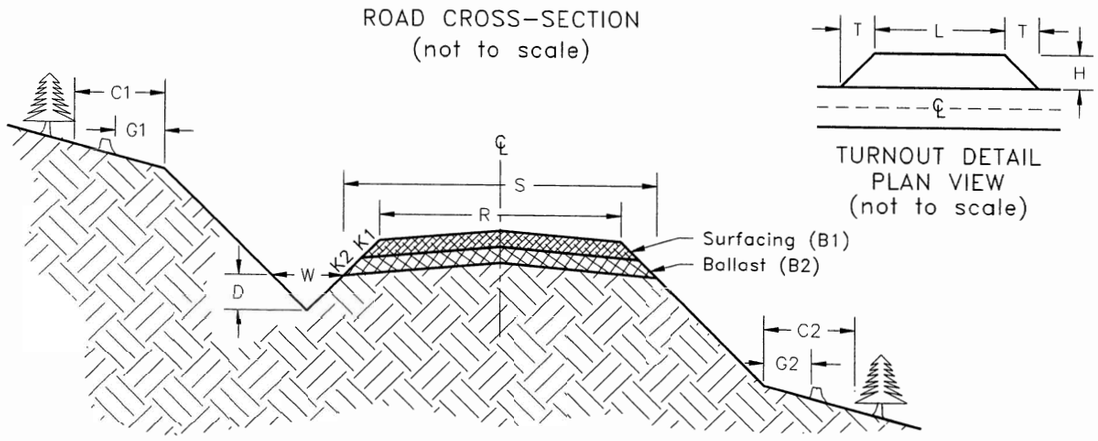
constructing non-drivable water bars in conformance with the attached NON-DRIVABLE WATER BAR DETAIL at a maximum spacing which will produce a vertical drop of no more than 10 feet between water bars or between natural drainage paths and with a maximum spacing of 100 feet; or as marked in the field;
skewing water bars at least 30 degrees from perpendicular to the road centerline on roads in excess of 3% grade;
keying water bars into ditchline;
construction of tank trap barriers in conformance with the attached "T" TANK TRAP DETAIL;
removing culverts and bridges from State Land;
removing ditch cross drain culverts and leaving the resulting trench open;
sloping all trench walls and approach embankments no steeper than 1.5:1;
grass seeding concurrently with abandonment and in accordance with Clause: 5.4-3A;
covering, concurrently with abandonment, all exposed soils within 100 feet of any live stream, with a 8 inch deep layer of straw.

10.1-4

Heavy Abandonment shall consist of:

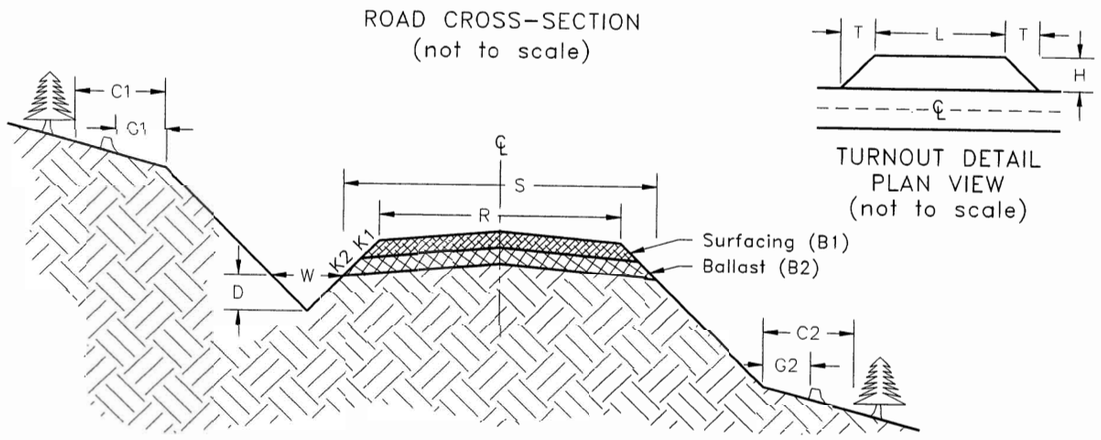
work shall be performed between July 1 and September 30;
filling the ditches;
ripping the surface to a minimum depth of 10 inches;
outsloping the surface at a minimum of 45%;
removing embankments, all sidecast fill, and placing material into cutbanks and shaping banks to conform with natural ground;
constructing non-drivable water bars, as directed by Contract Administrator, in conformance with the attached NON-DRIVABLE WATER BAR DETAIL at a maximum spacing which will produce a vertical drop of no more than 10 feet between water bars or between natural drainage paths and with a maximum spacing of 100 feet;or as marked in the field;
skewing water bars at least 30 degrees from perpendicular to the road centerline on roads in excess of 3% grade;
keying water bars into ditchline;
construction of tank trap barriers in conformance with the attached "T" TANK TRAP DETAIL;
removing culverts and bridges from State Land;
removing ditch cross drain culverts and leaving the resulting trench open;
sloping all trench walls and approach embankments no steeper than 1.5:1;
removing old puncheon from two stream crossings on Spur T-2 at the locations indicated on the Road Plan;
grass seeding concurrently with abandonment and in accordance with Clause: 5.4-3A;
covering, concurrently with abandonment, all exposed soils within 100 feet of any live stream, with a 8 inch deep layer of straw.

TYPICAL SECTION SHEET



Road Number	From Station	To Station	Tolerance Class	Subgrade Width	Road Width	Ditch		Crown in. @ CL	Grubbing Limits		Clearing Limits	
						Width	Depth					
				S	R	W	D		G1	G2	C1	C2
Spur 1	0+00	10+49	C	18'	12'	2'	1'	5"	4'	4'	15'	15'
T - 1	0+00	7+54	C	18'	12'	2'	1'	5"	4'	4'	15'	15'
T - 2	0+00	6+28	C	18'	12'	2'	1'	5"	4'	4'	15'	15'

ROCK LIST



BALLAST

Road Number	From Station	To Station	Rock Slope	Compacted Rock Depth	C.Y./ Station	# of Stations	C.Y. Subtotal	Rock Source	Turnout		
									Length	Width	Taper
			K2	B2					L	H	T
Spur 1	0+00	10+49		12"	51	10.49	534.99	Cathlamet Pit			
T - 1	0+00	7+54		12"	51	7.54	384.54	3600 Pit			
T - 2	0+00	6+28		12"	51	6.28	320.28	Cathlamet Pit			
East Road	2+97				51	1.00	51	3600 Pit			
	9+72				51	1.00	51	3600 Pit			
	0+00	16+15			24	14.15	339.6	Cathlamet Pit			
Spur 1 turnaround	8+56			12"	51	0.75	38.25	Cathlamet Pit			
T - 1	Landing			12"	51	1.00	51	3600 Pit			
T - 2	Landing			12"	51	1.00	51	Cathlamet Pit			

BALLAST TOTAL 1,822 Cubic Yards

BALLAST

Road Number	From Station	To Station	Rock Slope	Compacted Rock Depth	C.Y./ Station	# of Stations	C.Y. Total	Rock Source
			K1	B1				
Crushed rock stockpile base .							800	Cathlamet Pit

BALLAST TOTAL 800 Cubic Yards

PATCHES

ROAD PLAN MAP

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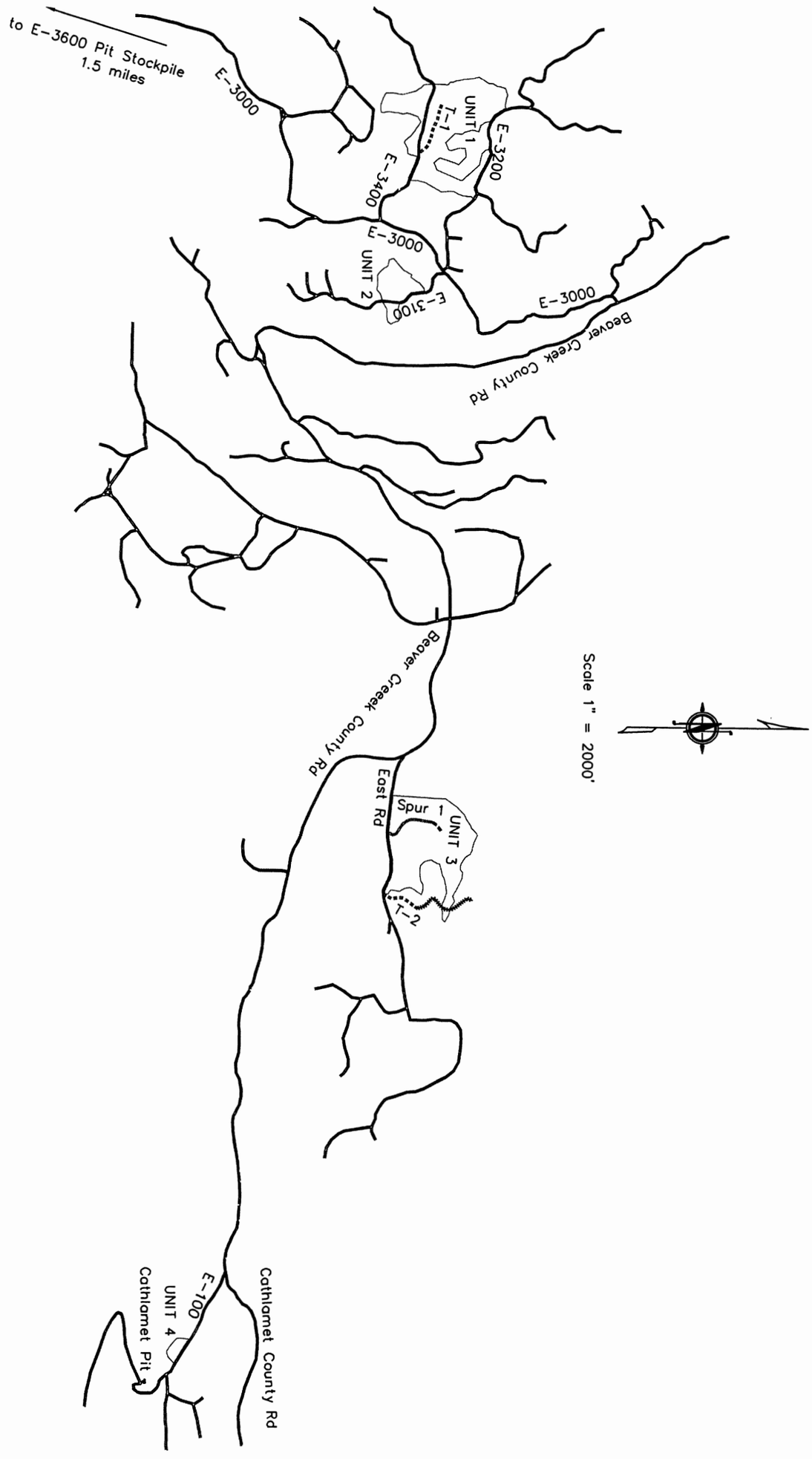

PATCHES
ROAD PLAN MAP
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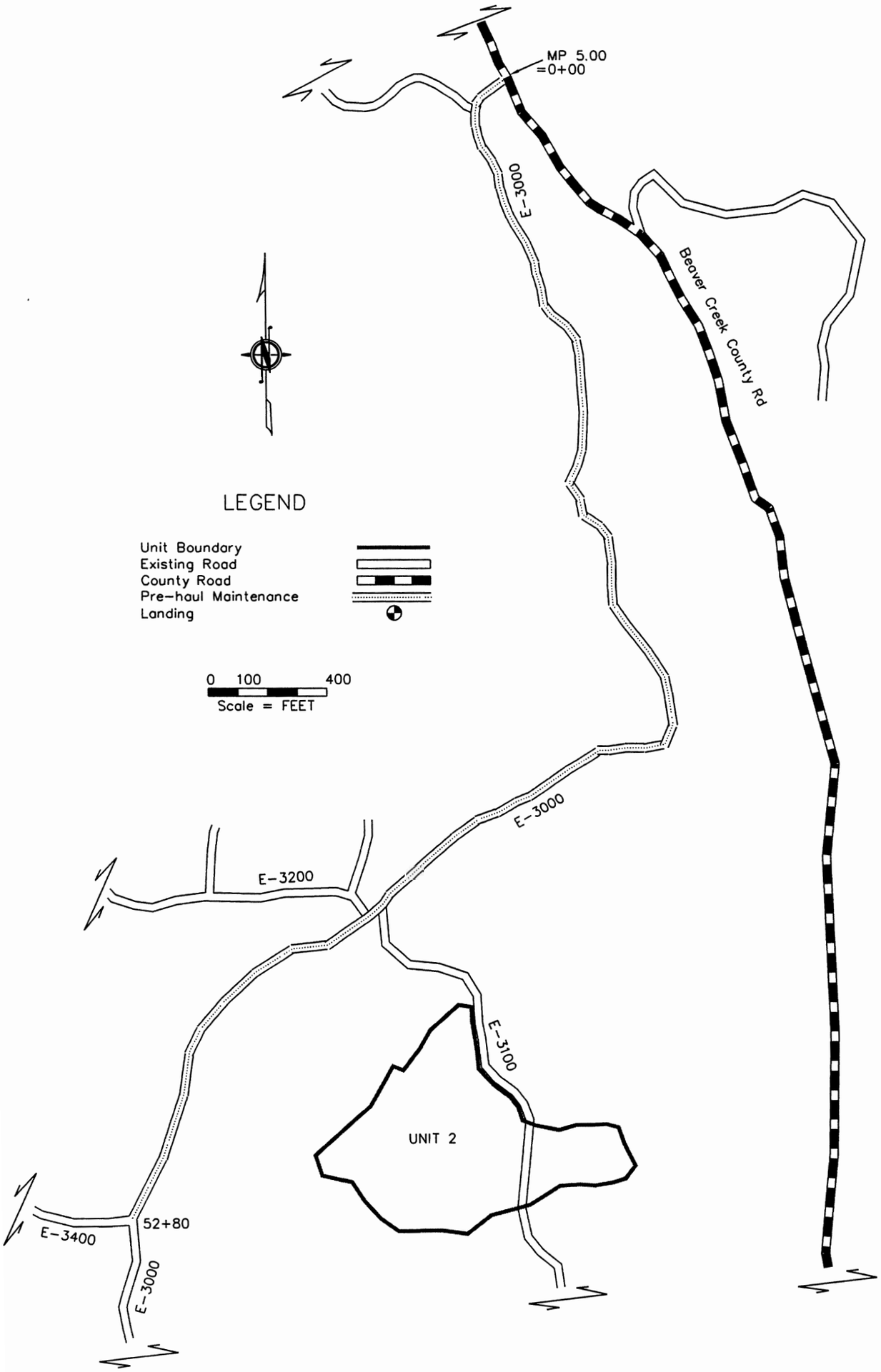

PATCHES
ROAD PLAN MAP
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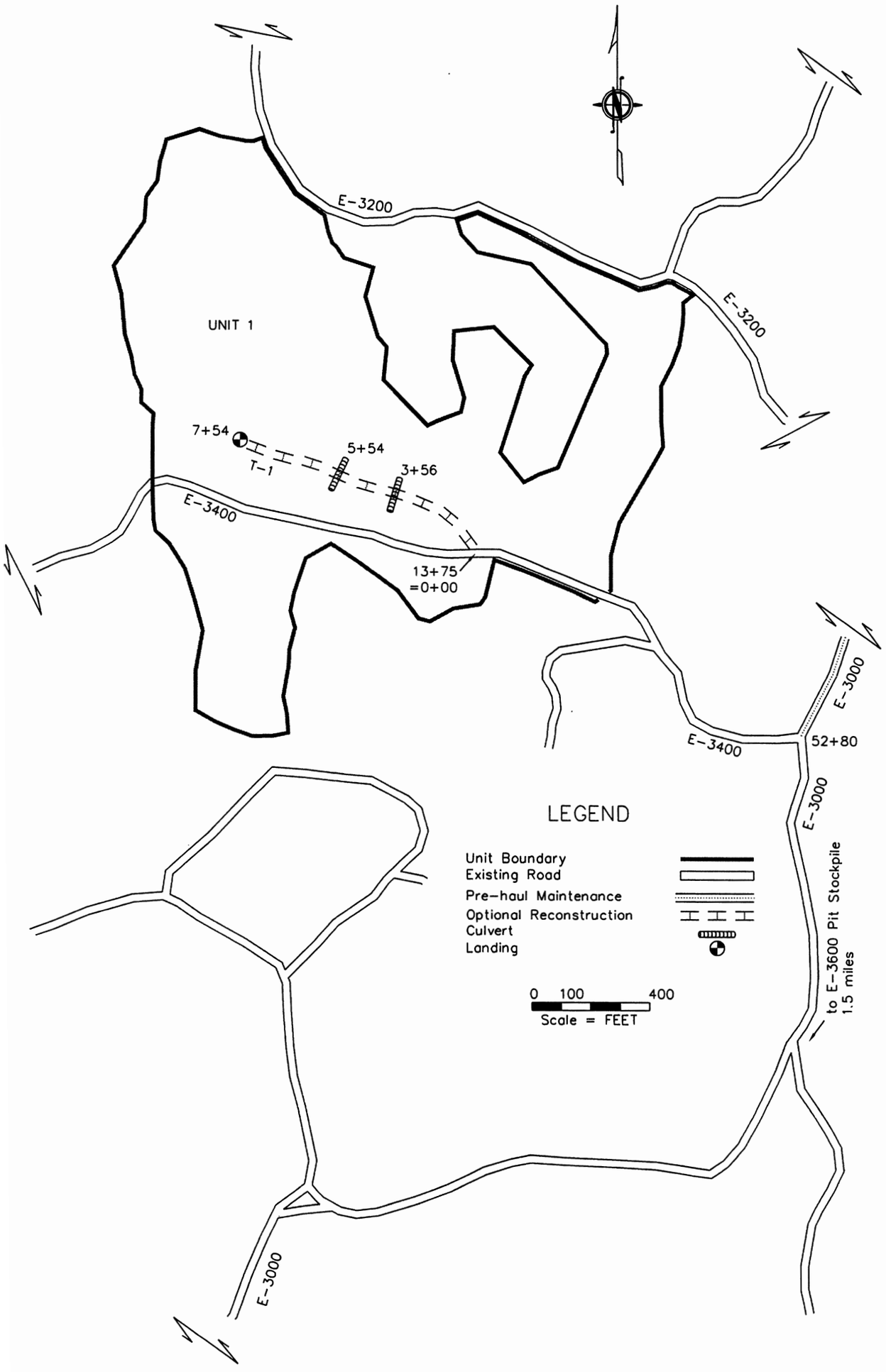

PATCHES
ROAD PLAN MAP
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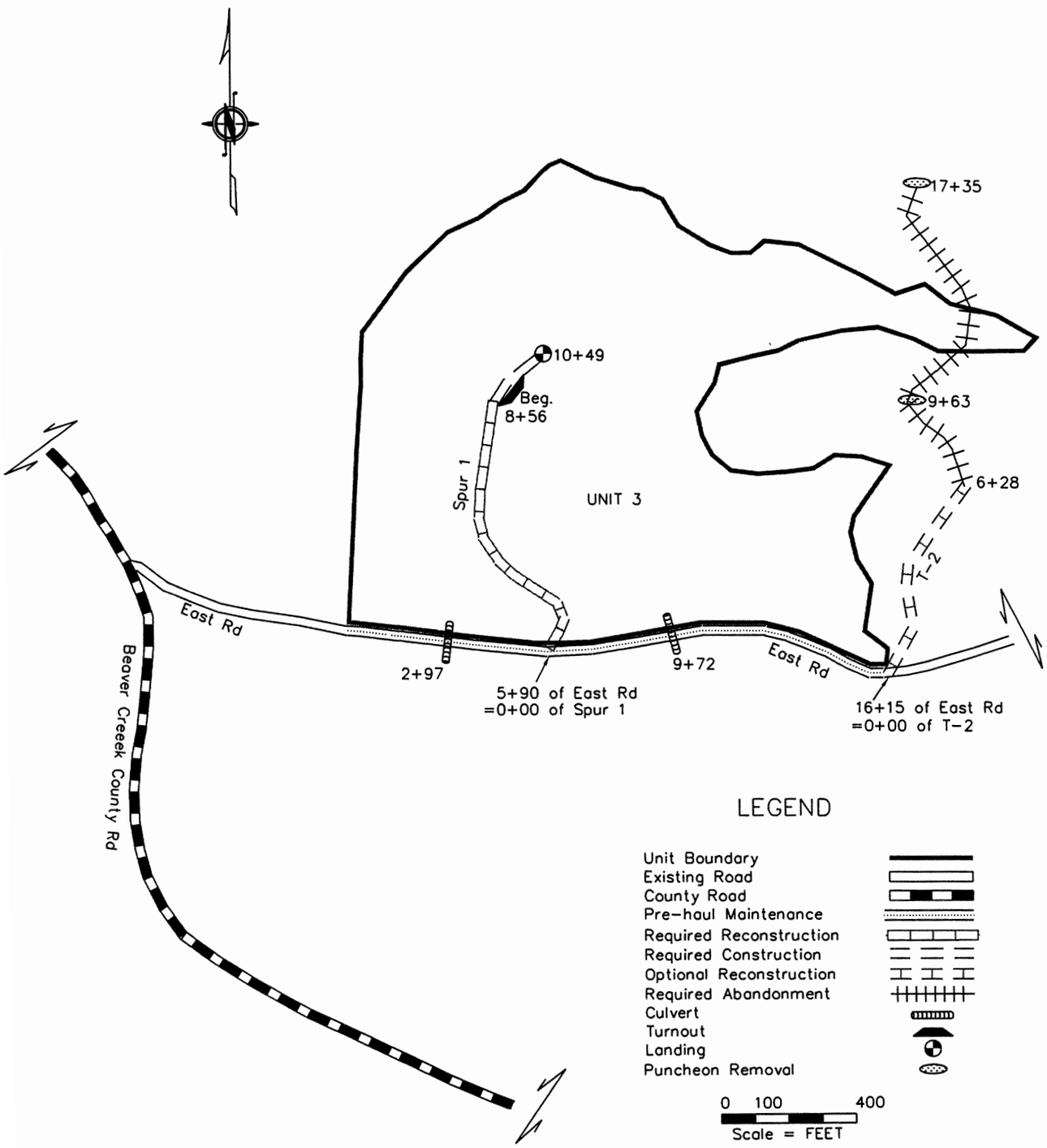
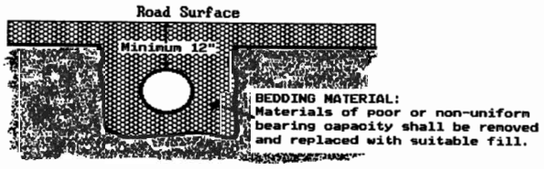


CULVERT LIST

Road Number	Location	Culvert Dia.	Culvert Gauge	Length (ft) Culvert	Downspt	Flume	Riprap (C.Y.) Inlet	Outlet	Type	Backfill Material	Placement Method	Const. Staked	Remarks
			If Steel										
East Road	2+97	18"	16	30	-	-	-	-	-	-	-	-	
	9+72	18"	16	30	-	-	-	-	-	-	-	-	
T- 1	3+56	18"	16	30	-	-	-	-	-	-	-	-	
	5+54	18"	16	30	-	-	-	-	-	-	-	-	

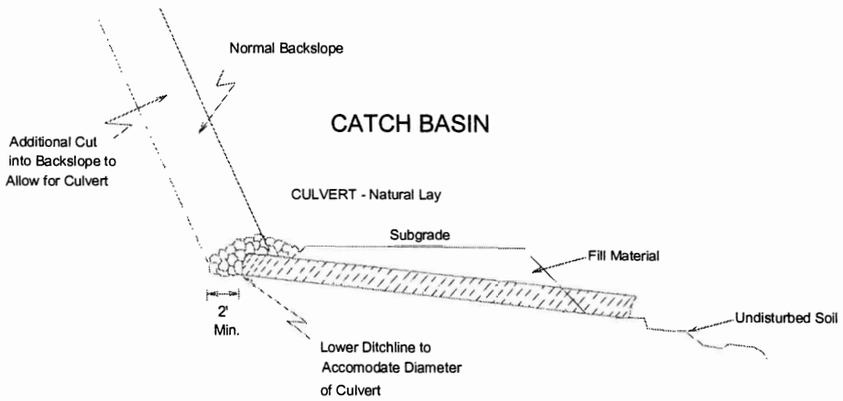
CULVERT BACKFILL AND BASE PREPARATION
(For culverts less than 36")

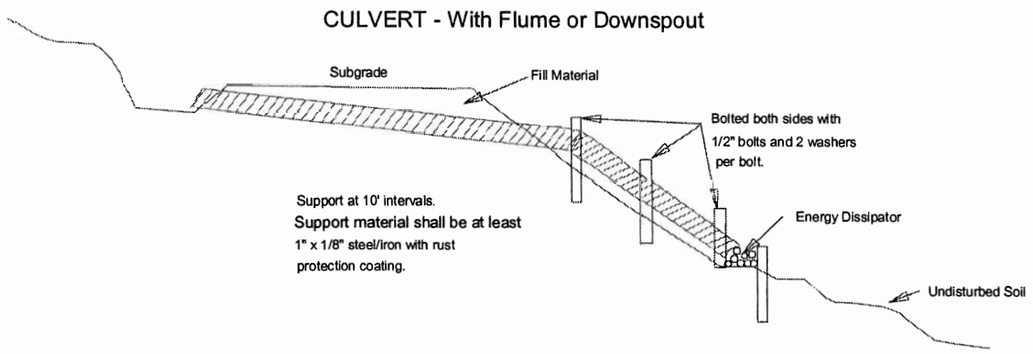


Key:

SR - Shot Rock
NT - Native (bank run)
SL - Select Fill
HL - Heavy Loose Riprap
LL - Light Loose Riprap
Flume - Half round pipe
Downspout - Full round pipe

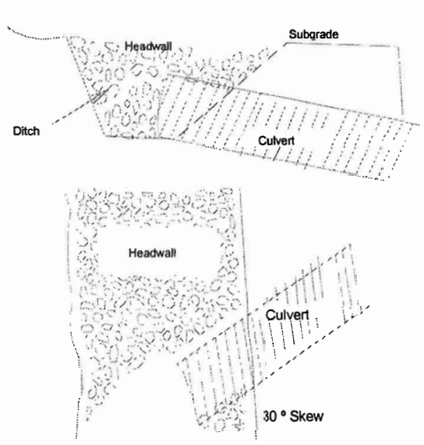
CULVERT AND DRAINAGE SPECIFICATION DETAIL





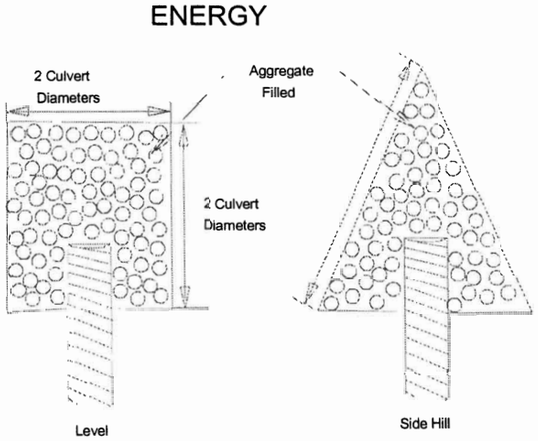
Proper preparation of foundation and placement of bedding material shall precede the installation of all culvert pipe. This includes necessary leveling of the native trench bottom and compaction of required bedding material to form a uniform dense unyielding base. The backfill material shall be placed so that the pipe is uniformly supported along the barrel.

HEADWALLS



Headwalls to be constructed of material that will resist erosion.

ENERGY



Dissipater Specifications:
Depth: 1 culvert diameter
Aggregate: as specified in the CULVERT LIST.

CULVERT AND DRAINAGE SPECIFICATION DETAIL

(Page 2 of 2)

POLYETHYLENE PIPE INSTALLATION

INSTALLATION REQUIREMENTS:

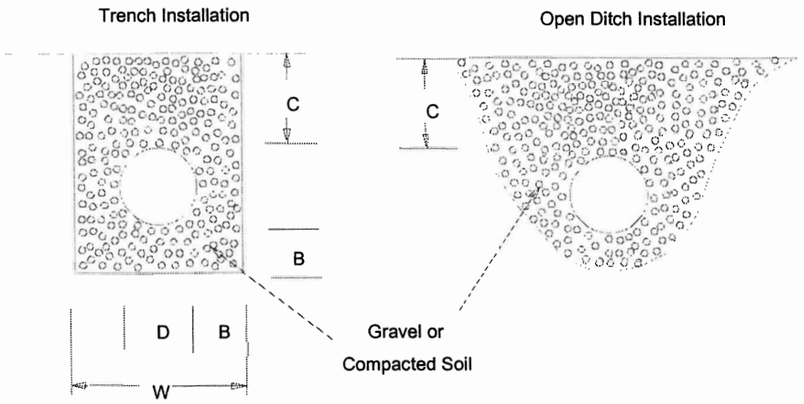
1. Crushed stone, gravel, or compacted soil backfill material shall be used as the bedding and envelope material around the culvert. The aggregate size shall not exceed 1/6 pipe diameter or 4" diameter whichever is smaller.

2. The corrugated pipe shall be laid on grade, on a layer of bedding material as shown for the two types of installations. If native soil is used as the bedding and backfill material, it shall be well compacted in six inch layers under the haunches, around the sides and above the pipe to the recommended minimum height of cover.

3. Either crushed aggregate or flexible (asphalt) pavement may be laid as part of the minimum cover requirements.

4. Site conditions and availability of bedding materials often dictate the type of installation method used.

5. The load bearing capability of flexible conduits is dependent on the type of backfill material used and the degree of compaction achieved. Crushed stone and gravel backfill materials typically reach a compaction level of 90-95% AASHTO standard density without compaction. When native soils are used as backfill material, a compaction level of 85% is required. This minimum compaction can be achieved by either hand or mechanical tamping.



MINIMUM DIMENSIONS
Trench or Open Ditch Installation

Nominal Diameter	Minimum Thickness	Minimum Cover	Min. Trench Width
D	B	C	W
18"	6"	12"	36"
24"	6"	12"	42"
30"	6"	12"	48"
36"	6"	12"	54"

STATE OF WASHINGTON
DEPARTMENT OF NATURAL RESOURCES

FOREST ACCESS ROAD
MAINTENANCE SPECIFICATIONS

1. CONSTRUCTION AND RECONSTRUCTION (Prior to acceptance to the contract or acceptance on a timber sale).

A. Cuts and Fills
   1. Maintain slope lines as constructed. Remove slides from the ditches and roadway. Replace fills to 1½:1 slopes with selected material or as directed. Remove overhanging material from the cut slopes.
   2. Material from slides or other sources requiring removal shall not be deposited in streams or at locations where it will erode into streams or watercourses.
   3. Undesirable slide materials and debris shall not be mixed into the surface material.

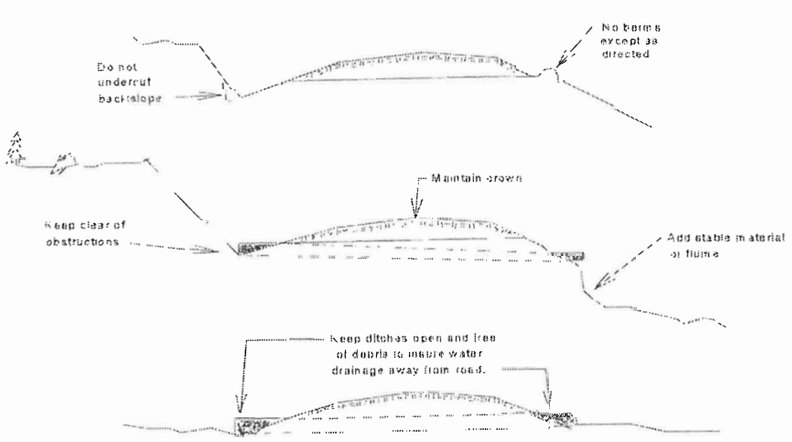
B. Surface
   1. Grade and shape the road surface, turnouts, and shoulders to the original crown, inslope or outslope as directed to provide suitable traveled surface and surface water runoff in an even, unconcentrated manner.
   2. Blading must not undercut the backslope at the bottom of the ditchline or cut geotextile at centerline.
   3. Watering may be required to control dust and to retain fine surface rock.
   4. Desirable surface material shall not be bladed off the roadway.
   5. Replace surface material lost or worn away.
   6. Remove berms except as directed by the State.
   7. Barrel spread soft spots to prevent degradation of geotextile.

C. Drainage
   1. Keep ditches and drainage channels at outlets and inlets of culverts clear of obstructions and functioning as intended.
   2. Inspect and clean culverts at least monthly, with additional inspections during storms and periods of high runoff. This must be done even during periods of inactivity.
   3. Add stable material at the outlet end of the culvert as needed to stabilize the streambed.
   4. Headwalls: maintain to the road shoulder level with material that will resist erosion.
   5. Keep silt bearing surface runoff from getting into live streams.

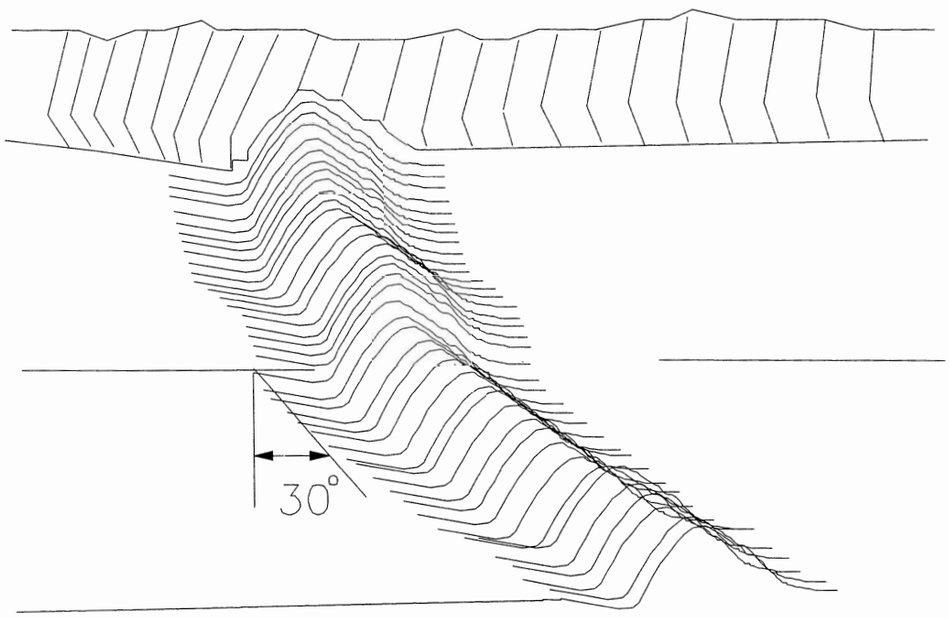
D. Structures
   Repair bridges, culverts, cattleguards, fences, and other road structures to the condition required by the construction specifications.

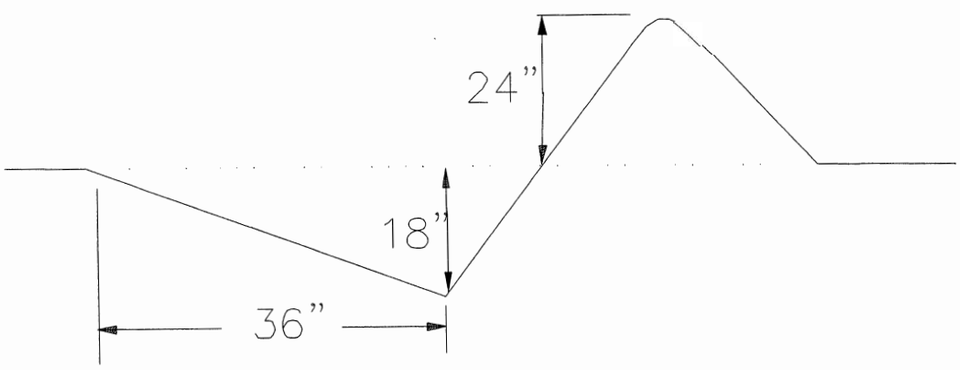
E. Termination of Use or End of Season
   Do maintenance work to minimize damage from the elements such as blading to insure correct runoff, ditch, and culvert cleaning and water bars.

F. Debris
   Remove fallen timber, limbs, and stumps from the slopes or roadway.

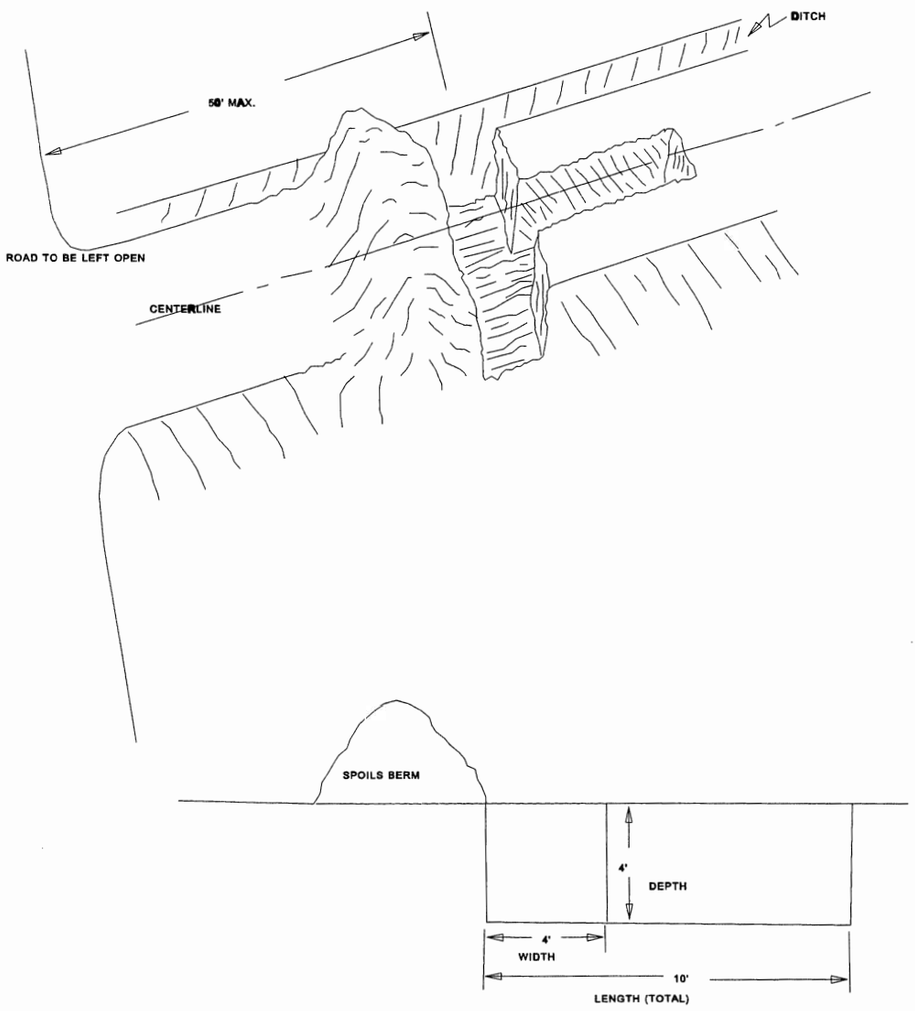


NON-DRIVABLE WATER BAR DETAIL





"T" TANK TRAP DETAIL



ROAD COST SUMMARY

Sale Name Patches **Agr. No. 30-0 76613**

Compiled by Robert Hoffman Date 8/17/044

	Road Cost
Road No. Spur 1	$ 7,120.43
Road No. T - 1	$ 7,641.04
Road No. T - 2	$ 5,237.74
Road No. East Road	$ 5,491.23
Road No. Rock Crushing	$ 82,144.50
Road No. Pre-haul Maintenance	$ 1,393.80
Total	$ 109,028.74

Sale Volume 3,000 $/Mbf **$36.34**

ROAD COSTING FORM

Sale Name Patches **Agr. No. 30-** 76613 **Road No.** Spur 1

Compiled by Robert Hoffman Date Re-construction & New August 17, 2004

No. of Stations 10.49 R/W Width

CLEARING & GRUBBING

	Cat days:	2	@	$	703.00	=	$	1406.00	
	Excavator days		@	$		=	$		
	Revegetation:		@	$		=	$		$ 1,406.00

EXCAVATION

	Cat days:	1	@	$	703.00	=	$	703.00	
	Excavator days	0.5	@	$	1000.00	=	$	500.00	
Endhaul volume			@	$		=	$		$ 1,203.00

BALLAST & SURFACING

Depth	yds/sta	X	stations	=	yards
12	51		10.49		534.99
	51		0.75		38.25

UNIT COSTS	Ballast	Surfacing	Riprap
Drill & shoot			
Dig & load		0.93	
Purchase			
Haul		1.00	
Spread		0.34	
Compact		0.30	
Strip/Reclaim		0.17	
Crush			
Total		2.74	

Ballast Source:
Surface Source: Cathlamet Pit Stockplie
Riprap Source:

Ballast		yds @ $		/yds = $			
Surface	573.24	yds @ $	2.74	/yds = $	1570.68		
Riprap		yds @ $		/yds = $		$	1,570.68

CULVERTS & FLUMES

G-(Galvanized) P-(Plastic) ED-(energy dissipator) F-(flume)

Diam.	No.	Ga.	Type	Length	Cost/ft	Total

$

ABANDONMENT

	Excavator days	0.25	@	$	1000.00		
			@	$		$	250.00

OTHER Only the last 193 feet will be Abandoned $

MOVE IN

Dozer	@	$	618.00
Dump	@	$	155.00
Loader	@	$	371.00
Excavator	@	$	618.00

$ 1762.00

Cost per Station $ 678.78

GENERAL EXPENSES **Subtotal** $ 6,191.68 Subtotal X 1.15% **Total** $ 7,120.43

Page 2

ROAD COSTING FORM

Sale Name Patches **Agr. No. 30-** 76613 **Road No.** T - 1

Compiled by Robert Hoffman Date August 17, 2004

No. of Stations 7.54 R/W Width

CLEARING & GRUBBING

	Cat days:	1	@	$	703.00	=	$	703.00	
	Excavator days		@	$		=	$		
	Revegetation:		@	$		=	$		$ 703.00

EXCAVATION

	Cat days:	1	@	$	703.00	=	$	703.00	
	Excavator days	1	@	$	703.00	=	$	703.00	
Endhaul volume			@	$		=	$		$ 1,406.00

BALLAST & SURFACING

Depth	yds/sta	X	stations	=	yards
	51		7.54		384.54
	landing				
	51		1		51

UNIT COSTS	Ballast	Surfacing	Riprap
Drill & shoot			
Dig & load		0.93	
Purchase			
Haul		1.00	
Spread		0.34	
Compact		0.30	
Strip/Reclaim		0.17	
Crush			
Total		2.74	

Ballast Source:
Surface Source: 3600 Pit Stockpile
Riprap Source:

Ballast		yds @ $		/yds = $			
Surface	435.54	yds @ $	2.74	/yds = $	1193.38		
Riprap		yds @ $		/yds = $		$	1,193.38

CULVERTS & FLUMES

G-(Galvanized) P-(Plastic) ED-(energy dissipator) F-(flume)

Diam.	No.	Ga.	Type	Length	Cost/ft	Total
18	2	16	P	60	18.00	1080.00

$ 1,080.00

ABANDONMENT

	Excavator days	0.5	@	$	1000.00	
			@	$		$ 500.00

OTHER $

MOVE IN

Dozer	@	$	618.00
Dump	@	$	155.00
Loader	@	$	371.00
Excavator	@	$	618.00

$ 1,762.00

Cost per Station $ 1013.40

GENERAL EXPENSES **Subtotal** $ 6644.38 Subtotal X 1.15% **Total** $ 7,641.04

ROAD COSTING FORM

Sale Name Patches **Agr. No. 30-** 76613 **Road No.** T - 2

Compiled by Robert Hoffman Date August 17, 2004

No. of Stations 6.28 R/W Width

CLEARING & GRUBBING

	Cat days:	1	@	$	703.00	=	$	703.00	
	Excavator days		@	$		=	$		
	Revegetation:		@	$		=	$		$ 703.00

EXCAVATION

	Cat days:	0.75	@	$	703.00	=	$	527.25	
	Excavator days		@	$		=	$		
Endhaul volume			@	$		=	$		$ 527.25

BALLAST & SURFACING

Depth	yds/sta	X	stations	=	yards
	51		6.28		320.28
	Landing				
	51		1		51

UNIT COSTS	Ballast	Surfacing	Riprap
Drill & shoot			
Dig & load		0.93	
Purchase			
Haul		1.00	
Spread		0.34	
Compact		0.30	
Strip/Reclaim		0.17	
Crush			
Total		2.74	

Ballast Source:
Surface Source: Cathlamet Pit Stockpile
Riprap Source:

Ballast		yds @ $		/yds = $			
Surface	371.28	yds @ $	2.74	/yds = $	1017.31		
Riprap		yds @ $		/yds = $		$	1,017.31

CULVERTS & FLUMES

G-(Galvanized) P-(Plastic) ED-(energy dissipator) F-(flume)

Diam.	No.	Ga.	Type	Length	Cost/ft	Total

$

ABANDONMENT

	Excavator days	0.5	@	$	1000.00	
			@	$		$ 500.00

OTHER

$

MOVE IN

Dozer	@	$	618.00
Dump	@	$	200.00
Loader	@	$	371.00
Excavator	@	$	618.00

$ 1,807.00

Cost per Station $ 834.04

GENERAL EXPENSES **Subtotal** $ 4554.56 Subtotal X 1.15% **Total** $ 5,237.74

ROAD COSTING FORM

Sale Name Patches **Agr. No. 30-** 76613 **Road No.** East Road

Compiled by Robert Hoffman Date August 17, 2004

No. of Stations 16.15 R/W Width

CLEARING & GRUBBING

	Cat days:		@	$		=	$		
	Excavator days		@	$		=	$		
	Revegetation:		@	$		=	$		$

EXCAVATION

	Grader Days:	1.25	@	$	528.00	=	$	660.00	
	Excavator days	1	@	$		=	$		
Endhaul volume			@	$		=	$		$ 660.00

BALLAST & SURFACING

Depth	yds/sta	X	stations	=	yards
	51		2		102
	24		14.15		339.6

UNIT COSTS	Ballast	Surfacing	Riprap
Drill & shoot			
Dig & load		0.93	
Purchase			
Haul		1.00	
Spread		0.34	
Compact		0.30	
Strip/Reclaim		0.17	
Crush			
Total		2.74	

Ballast Source:
Surface Source: Cathlamet Pit Stockpile
Riprap Source:

Ballast		yds	@ $		/yds = $		
Surface	441.6	yds	@ $	2.74	/yds = $	1209.98	
Riprap		yds	@ $		/yds = $		$ 1,209.98

CULVERTS & FLUMES

G-(Galvanized) P-(Plastic) ED-(energy dissipator) F-(flume)

Diam.	No.	Ga.	Type	Length	Cost/ft	Total
18	2	16	P	60	18.00	1080.00

$ 1,080.00

ABANDONMENT

	Excavator days		@	$	
			@	$	

$

OTHER

$

MOVE IN

Grader	@	$	371.00
Dumps 3	@	$	465.00
Loader	@	$	371.00
Excavator	@	$	618.00

$ 1,825.00

Cost per Station $ 340.01

GENERAL EXPENSES **Subtotal** $ 4774.98 Subtotal X 1.15% **Total** $ 5,491.23

ROAD COSTING FORM

Sale Name Patches **Agr. No. 30-** 76613 **Road No.** Rock Crushing

Compiled by Robert Hoffman Date August 17, 2004

No. of Stations _____ R/W Width _____

CLEARING & GRUBBING

_____	Cat days:	_____	@	$	_____	=	$	_____	
_____	Excavator days	_____	@	$	_____	=	$	_____	
_____	Revegetation:	_____	@	$	_____	=	$	_____	$ _____

EXCAVATION

_____	Cat days:	_____	@	$	_____	=	$	_____	
_____	Excavator days	_____	@	$	_____	=	$	_____	
Endhaul volume		_____	@	$	_____	=	$	_____	$ _____

BALLAST & SURFACING

Depth	yds/sta	X	stations	=	yards
Stockpile	site floor base- pit run rock.				800

UNIT COSTS	Ballast	Surfacing	Riprap
Drill & shoot		3.57	
Dig & load	0.93	0.93	
Purchase			
Haul	0.64	0.64	
Spread	0.28		
Compact	0.20		
Strip/Reclaim	0.17	0.17	
Crush		3.00	
Total	2.22	8.31	

: Source: _____
: Source: _____
: Source: _____

Ballast	800	yds	@	$	2.22	/yds = $	1776.00	
Surface	7500	yds	@	$	8.31	/yds = $	62325.00	
Riprap		yds	@	$		/yds = $		$ 64,101.00

CULVERTS & FLUMES G-(Galvanized) P-(Plastic) ED-(energy dissipator) F-(flume)

Diam.	No.	Ga.	Type	Length	Cost/ft	Total

$ _____

ABANDONMENT

_____	Excavator days	_____	@	$	_____
_____		_____	@	$	_____

$ _____

OTHER _____ $ _____

MOVE IN

Drill	@	$	618.00	
Dumps 3	@	$	465.00	
Loader	@	$	371.00	
Rock Crusher	@	$	5875.00	$ 7,329.00

Cost per Station $ _____

GENERAL EXPENSES **Subtotal** $ 71430.00 Subtotal X 1.15% **Total** $ 82,144.50

ROAD COSTING FORM

Sale Name Patches **Agr. No. 30- 076613** **Road No.** Pre-haul Maintenance

Compiled by Robert Hoffman Date August 17, 2004

No. of Stations 52.8 R/W Width

CLEARING & GRUBBING

	Grader Days:	2	@	$	528.00	=	$	1056.00	
	Excavator days		@	$		=	$	0.00	
	Revegetation:		@	$		=	$	0.00	$ 1,056.00

EXCAVATION

	Cat days:		@	$		=	$	0.00	
	Excavator days		@	$		=	$	0.00	
Endhaul volume			@	$		=	$	0.00	$ 0.00

BALLAST & SURFACING

Depth	yds/sta	X	stations	=	yards
					0
					0
					0
					0
					0
					0
					0

UNIT COSTS	Ballast	Surfacing	Riprap
Drill & shoot			
Dig & load			
Purchase			
Haul			
Spread			
Compact			
Strip/Reclaim			
Crush			
Total	0.00	0.00	0.00

Ballast Source:
Surfacing Source:
Rip Rap Source:

Ballast		yds	@	$	0.00	/yds =	$	0.00
Surface	7500	yds	@	$	0.00	/yds =	$	0.00
Riprap		yds	@	$	0.00	/yds =	$	0.00

$ 0.00

CULVERTS & FLUMES

G-(Galvanized) P-(Plastic) ED-(energy dissipator) F-(flume)

Diam.	No.	Ga.	Type	Length	Cost/ft	Total
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00
						0.00

$ 0.00

ABANDONMENT

	Excavator days	@	$		
		@	$		$ 0.00

OTHER

$

MOVE IN:

	@	$	
Grader	@	$	156.00
	@	$	
	@	$	

$ 156.00

Cost per Station $ 26.40

GENERAL EXPENSES

Subtotal $ 1212.00 Subtotal X 1.15% **Total** $ 1,393.80